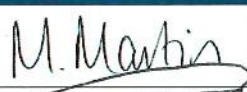



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WERRIS CREEK MINE

DAM SAFETY EMERGENCY PLAN VOID WATER DAMS 1, 3 AND 4

Approval	Name	Position	Signed	Date
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Prepared by:

Title	Name	Signature	Date
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Senior Environmental Manager	S. van der Meulen Onward Consulting		19 April 2022

This document has been prepared by Onward Consulting to comply with the requirements of the Dams Safety Regulation 2019 (NSW) and has relied upon the relevant information provided by Werris Creek Coal Pty Ltd and generally available at the time of writing and all findings, conclusions or recommendations contained herein are based thereon. This document is for the use of Werris Creek Coal Pty Ltd and no responsibility will be taken for its use by other parties. Werris Creek Coal Pty Ltd may, at its discretion, use this document to inform regulators and the public.



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Acronyms and abbreviations

Acronym	Description
°	degree
AEP	Annual Exceedance Probability
AHD	Australian Height Datum
DPIE	NSW Department of Planning, Industry and Environment
DSEP	Dam Safety Emergency Plan (this Plan)
EMS	Environmental Management System
EPA	NSW Environment Protection Authority
EPL	environment protection licence under the POEO Act
ha	hectare
HSE	health, safety and environment
km	kilometre
km ²	square kilometre
L	litre
ML	megalitre
mm	millimetre
m	metre
MOL	maximum operating level
NSW	New South Wales
OCE	Open Cut Examiner
O&M Plan	Operations and Maintenance Plan
PIRMP	Pollution Incident Response Management Plan
POEO Act	<i>Protection of the Environment Operations Act 1997</i> (NSW)
PMP	Probable Maximum Precipitation
SES	State Emergency Services
VWD	void water dam
WCC	Werris Creek Coal Pty Limited
WCM	Werris Creek Mine
WHC	Whitehaven Coal Mining Limited
WMP	WCM Water Management Plan

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1. Introduction

1.1 Background

The Werris Creek Mine (**WCM**) is an open cut coal mining operation located approximately 4 kilometres (**km**) south of Werris Creek and approximately 11 km north of Quirindi in New South Wales (**NSW**) as presented in Figure 1.1.

The WCM is owned and operated by Werris Creek Coal Pty Limited (**WCC**), a wholly owned subsidiary of Whitehaven Coal Mining Limited (**WHC**).

1.2 Purpose and scope

Declared dams are those dams declared by order under section 5 of the *Dams Safety Act 2015* (NSW) (**Dams Safety Act**). The owner of a declared dam must prepare and implement an appropriate emergency plan for the dam.

WCC (through WHC), as the owner of the declared dams at WCM, has prepared this Dam Safety Emergency Plan (**DSEP** or **Plan**) to describe the emergency response procedures that will be followed by operational personnel. The operational personnel are responsible for managing the declared dams in the event of an imminent or actual uncontrolled failure of the dam structure that may present a risk to personnel, the general public or the surrounding environment. It has been developed in accordance with the applicable regulatory framework and to meet the requirements of any associated development and compliance conditions.

The DSEP has been developed with reference to the *Dams Safety NSW Guideline - Emergency Plans* (DPIE, 2021) (the '**Emergency Plans Guideline**') and to ensure compliance with the Dams Safety Act and the *Dams Safety Regulation 2019* (NSW) (**Dams Safety Regulation**). It is to be noted that the Emergency Plans Guideline is not a legislative document and that WCC is not required to adopt the suggested methods, techniques or other material contained in it if more suitable approaches can be adopted.

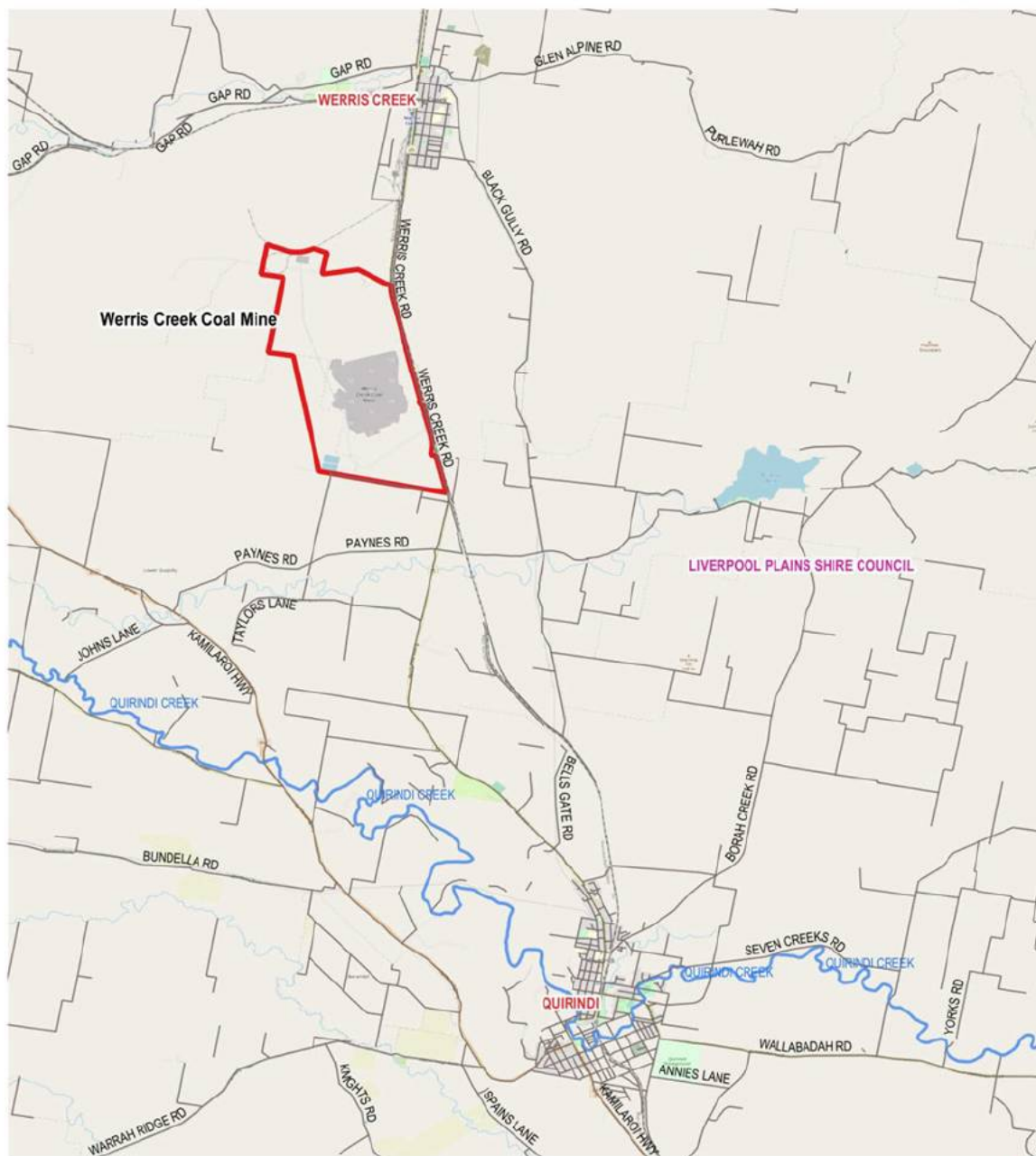
This DSEP applies only to the declared dams and complements the Pollution Incident Response Management Plan (**PIRMP**) which in turn forms part of the suite of documents prepared as part of the WCM Environmental Management System (**EMS**). It should be noted that in the event of a pollution emergency in the field, the PIRMP remains the overarching strategy document and will prevail. However, the DSEP will be referenced for all incidents involving the WCM declared dams.



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LEGEND

- Werris Creek Mine
- Liverpool Plains Shire Council
- Roads
- Watercourse



WERRIS CREEK MINE

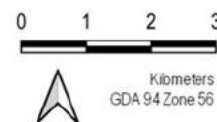


Figure 1.1 - Werris Creek Mine regional location

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1.3 Objectives

In accordance with the Emergency Plans Guideline, the objectives of this DSEP are to provide the following:

- a tool for the dam owner and other agencies to use during an emergency event to protect people, property and the environment; and
- a detailed description of the emergency management procedures and notification protocols in response to an emergency situation.

1.4 Document structure

This Plan forms part of the Dam Safety Management System (**DSMS**), which includes the full suite of frameworks, policies, plans and procedures related to managing dam safety at WCM. In summary, this document includes the following information:

- section 1 provides the background to the WCM, a summary of the planning approval and the purpose and scope of this DSEP;
- section 2 summarises the roles and responsibilities of the WCM personnel under this DSEP, including the details of the ultimate dam owner and owner's representative;
- section 3 provides the details and locations of the declared dams at WCM, including site access during emergencies;
- section 4 outlines the communication, monitoring and warning systems;
- section 5 details the emergency incident management process and the internal notification chain;
- section 6 lists the types of emergency categories for the purpose of incident management and emergency actions;
- section 7 identifies the emergency notification and actions;
- section 8 provides an overview of the risk controls, based on the Emergency Plans Guidelines;
- section 9 details the emergency contacts for the management of the WCM declared dams;
- section 10 provides the details of the preventative actions;
- sections 11 and 12 respectively outline the requirements for record keeping and the evaluation and review of the DSEP; and
- sections 13 and 14 respectively provide the reference documentation and glossary of terms used in the DSEP.

1.5 Distribution

A copy of the approved DSEP is available to all WCM personnel via the WHC intranet.

A copy of the DSEP has also been provided to Dam Safety NSW and the NSW State Emergency Services (**SES**). Note that wherever this DSEP refers to the SES, this may mean the NSW SES and/or any other local authority or emergency agency that needs to be involved in dealing with a dam emergency. This is especially important for testing of the DSEP.

It is to be noted that any printed copies of the DSEP not maintained by the WCM are uncontrolled.

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2. Roles and responsibilities

The WCM Open Cut Examiner (**OCE**) will have the immediate responsibility for the assessment of the nature and scale of any emergency and will consult with the WCM Operations Manager and Environmental Superintendent. The OCE will also make preparations for and undertake those initial remedial / preventative measures considered safe under the circumstances of the given emergency.

The Operations Manager will determine whether it is necessary to invoke the DSEP and will be responsible for all on-site activities associated with the DSEP.

The Operations Manager, OCE and Environmental Superintendent are responsible for implementing the DSEP. It is recommended that they attend an accredited course in Dam Safety Management and practice continuous professional development, in accordance with the requirements of Dam Safety NSW. Note that as an alternative to an accredited course, training may be provided by consultants.

The WCM declared dams with allocated “**Significant**” Sunny Day and Flood Consequence Categories and are currently registered with Dams Safety NSW as follows:

Owner: Whitehaven Coal Mining Limited

Owner’s Representative: Murray O’Keefe

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3. Dam location and access

3.1 Declared dams locations

The declared dams at WCM are Turkey's nest dams with minimal external catchment. Their primary purpose is to store water from the active mining area, including pit dewatering.

There are three declared dams on the WCM site including void water dam (VWD) 1, 3 and 4. The layout of the WCM site identifying the VWD locations, infrastructure and internal roads, is provided in Figure 3.1.

The VWDs are earth fill embankments constructed with engineered fill and having conservatively gentle grass-lined upstream and downstream batters and a wide crest. The more conceivable structural defect would involve excessive seepage through a defect (e.g. crack) in an embankment, potentially leading to internal erosion of the embankment and a "piping" failure. As such, any concentrated seepage which is discharging turbid or sediment-laden water indicates a potential emergency situation.

The key dimensions of VWD 1, VWD 3 and VWD 4 are summarised in Table 3.1.

Table 3.1 - Summary of VWD dimensions

Dimensions	VWD 1	VWD 3	VWD 4
Outside (plan) (m ²)	300	200	
Crest width (m)	5	5 to 20	
External batter slope (horizontal: vertical)	3:1	3:1	
Internal batter slope (horizontal: vertical)	4:1	3:1	
Embankment crest level - lowest point (mAHD)	364.5	365.3	
Maximum height above natural surface (m)	5.4	5.5	
Spillway invert level (mAHD) (spillway level)	363.73	364.3	
Maximum operating level (mAHD) (high water level)	363.43	364.0	
Storage capacity - spillway invert (ML)	252	226	155
Maximum operation volume (ML)	238	214	145
Total freeboard (MOL to crest) (m)	1.07	1.3	

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3.2 Void water quality

Assessment of water quality in VWD 1, VWD 3, and VWD 4 has been undertaken with reference to various triggers for short-term agricultural application (irrigation), livestock watering and aquatic ecosystem protection from the ANZECC 2000 Guidelines for Fresh and Marine Water Quality. These results illustrated each of the analytes tested generally comply with the Short-Term Exposure (STE) trigger level for irrigation of ANZECC (2000). In particular, the concentration of metals was generally undetectable or present at very low concentrations. Some minor exceedances of short-term exposure limits for irrigation of pH, electrical conductivity and sodium were identified. EPL 12290 authorises the discharge of void water off-site for agricultural use in accordance with prescribed concentration limits.

Based on this assessment, any release of water resulting from dam failure is expected to have a minor and short-term effect on the environment.

3.3 Access arrangement

VWD 3 is located immediately to the north of VWD 4, at the south-western corner of the site. VWD 1 is located approximate 350 m to the east along the southern boundary and is bounded to the north and west by existing coal mine infrastructure. The WCM site can be accessed from Quirindi or from Werris Creek as follows:

- From Quirindi, travel north along Werris Creek Road for 12.5 km, turn left into unnamed road (sign marked "Werris Creek Mine Pty Ltd"); and
- From Werris Creek, head south along Werris Creek Road for 6.5 km, turn right into unnamed road (sign marked "Werris Creek Mine Pty Ltd").

The surrounding low-lying property located immediately to the south of the site can be accessed from:

- Paynes Road off Werris Creek Road, 2.5 km south of the WCM access road; and
- Wadwells Lane, approximately 2.2 km west along Paynes Road from Werris Creek Road.

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4. Communication and warning system

4.1 Communication systems

The following telecommunication systems are available at the WCM site:

- telephone;
- internet;
- mobile phone coverage;
- satellite phone coverage; and
- radio communication systems, including UHF/VHF.

Apart from the radio communication, all listed systems are available to contact the emergency management agencies.

4.2 Monitoring and warning systems

The management of void water is critical to business continuity and the protection of the environment at WCM, and for this reason, the void water stream has a higher level of infrastructure and management controls in place. Both scenarios of too much water in the pit or not enough water for dust suppression would severely impact production at WCC.

A dedicated system of pumps, pipelines and dams has been established to manage void water on site. The Production Superintendent or delegate is responsible for the daily void water management, including void water pumping, the operation of evaporation fans and water cart dust suppression.

Piezometers have been installed in the vicinity of the VWD 1, VWD 3 and VWD 4 specifically to measure perched water tables that could indicate seepage through embankments and potential instability. Three piezometers at each facility have been installed so that a water table surface can be triangulated and monitored over time, while also providing an indication of any loss of containment from the dam that may contribute to groundwater contamination. All void water dams are inspected regularly to identify any potential areas of weakness or seepage pathways, with a risk management process used to guide corrective actions to respond to any identified problem areas.

In addition to regular inspections of void water dam storage levels, WCC has installed water level alarms in VWD 1, VWD 3 and VWD 4. Each water level alarm system will have two float switches, one at the dam full level ("High Water Level") designated as 0.3 m below the spillway level; and a water level just below the spillway level ("Spillway Level"). When triggered, the float switches will send a SMS message to the OCE (or delegate), Production Superintendent and the Environmental Superintendent for the condition "High Water Level" or to the OCE/delegate, Production Superintendent, Environmental Superintendent and Operations Manager when the "Spillway Level" has been reached and a spill is imminent.

Additional specific monitoring and management measures related to the void water dams are provided in the WCM Operations and Maintenance (O&M) Plan and the WCM Water Management Plan (WMP).

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5. Emergency incident management

An emergency notification and action flow chart is presented in Section 7. The following information is provided in support of the emergency notification and action flow chart for incident management for WCM only. The observer or recorder of an incident is responsible to instigate the notification chain up to the OCE (or delegate) for any incident considered to be an immediate safety or environmental concern. The WCM internal notification chain is provided in Figure 5.1.

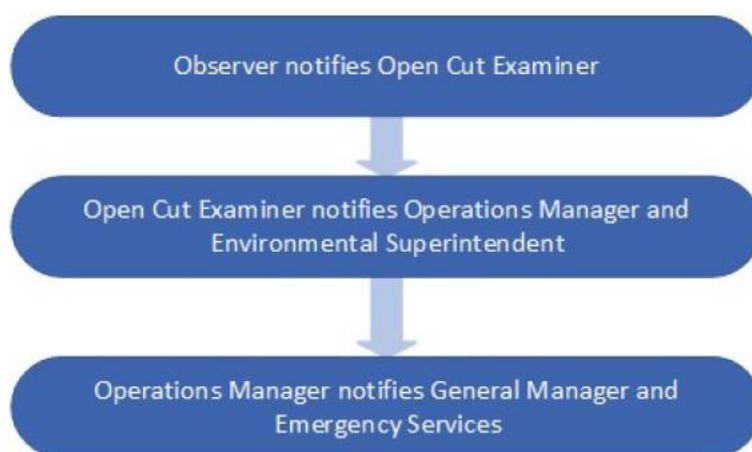


Figure 5.1 - WCM internal notification chain

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6. Emergency categories

For the purpose of incident management and emergency actions, the WCM declared dams emergency incidents related to dam failure are categorised into two failure scenarios, including specific alert criteria and emergency response actions:

- Overtopping failure outlined in Table 6.1; and
- Dam wall failure outlined in Table 6.2.

Table 6.1 - Emergency response - overtopping

Alert level	Typical defining conditions	WCM response	SES response
White	Potential incident detected due to water management issues or heavy rainfall event, or abnormal operational scenario (e.g. control equipment not operational due to maintenance).	Provide advice to SES	Notification of support agencies.
Amber	Overtopping possible if storage continues rising (e.g. 'Spillway Level' SMS alert triggered).	Provide warning to SES	Notification of support agencies. Monitoring at risk areas downstream. Check operational readiness.
Red	Release, including via the spillway, imminent or occurred.	Notify SES and warn downstream neighbours	Warn downstream population at risk to prepare to evacuate if required.

Table 6.2 - Emergency response - wall failure

Alert level	Typical defining conditions	WCM response	SES response
White	Structural defect detected (e.g. crack, piping), heavy rainfall event, or an unusual operational event	Provide warning to SES	Notification of support agencies. Monitoring at risk areas downstream. Check operational readiness.
Amber	Failure possible if storage continues rising or structural defect not fixed	Notify SES and warn downstream neighbours	Warn downstream population at risk to prepare to evacuate
Red	Failure imminent or occurred	Notify SES and warn downstream neighbours	Evacuation of downstream population

A flowchart outlining the sequence of notification required in response to an emergency incident is provided in Figure 7.1.

A comprehensive list of mechanisms which may result in a dam failure emergency incident is provided in Table A1 in Appendix A. The incident management and reporting processes for WCM declared dams is described in further detail in Section 6 of the WCM O&M Plan.

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7. Emergency notification

The external notification process in relation to emergency alert levels White, Amber and Red is outlined in Figure 7.1. A complete contact list for emergency notification is included in Section 9.

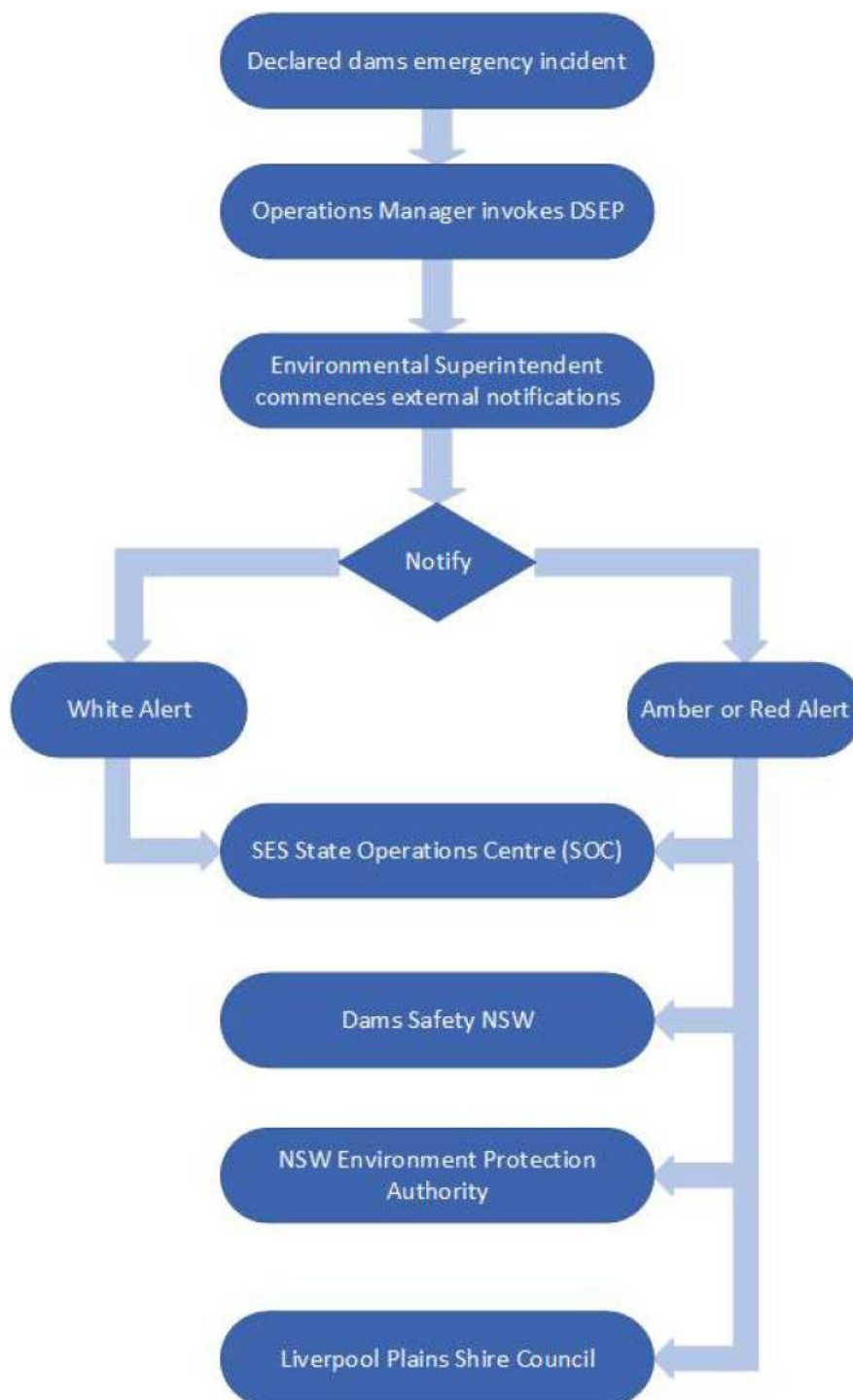


Figure 7.1 - Emergency external notification

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8. Risk controls

The following risk controls identified in Figure 8.1 are to be administered.



Figure 8.1 - Risk control flowchart

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The considerations as detailed in Table 8.1 are provided for the risk controls.

Table 8.1 - Risk control considerations

Item	Considerations
1	<ul style="list-style-type: none"> Potential human injuries and environmental harm should be managed by the Operations Manager. The potential risk of or further human injuries should be managed by removing any non-essential staff from the area of the incident.
2	<ul style="list-style-type: none"> Risks associated with the incident should be managed by barricading off or delineating danger areas and the affected area (if safe to do so) and restricting access. In assessing the extent of a potential uncontrolled release, no attempt should be made to traverse across or immediately downstream of the affected area. In the case of an imminent release, the potential release area should be barricaded (if safe to do so). Barricade the public roads to the south of the dam, including Paynes Road and Wadwells Lane (refer to Appendix B for dam failure inundation maps).
3	<ul style="list-style-type: none"> Water delivery pumps should be switched off. In the event of an imminent release, pump water from damaged dam into other dams within void water dam complex which have capacity.
4	<ul style="list-style-type: none"> Prevention of an imminent or additional release should be managed in consultation with the Geotechnical Design Engineer / Dam Design Engineer. An earthmoving contractor should be mobilised to site promptly for stabilisation works and, if required, the Geotechnical Design Engineer should also be mobilised to site to direct stabilisation works.
5	<ul style="list-style-type: none"> In the event of a release (Red Alert), agencies outlined in Figure 7.1 will be contacted. However, this should not be taken as a transfer of responsibility from the Incident Manager and support personnel. All WCM emergency procedures should still be implemented.
6	<ul style="list-style-type: none"> If a release has occurred which may impact infrastructure, the Liverpool Plains Shire Council, appropriate service providers (e.g. Essential Energy; Telstra) and landowners should be contacted.
7	<ul style="list-style-type: none"> Once the incident has been stabilised, regulatory authorities on the external contacts list should be notified and the required incident forms should be completed immediately.
8	<ul style="list-style-type: none"> Remediation works should be undertaken in consultation with WCM environmental personnel and the Geotechnical Design Engineer.

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9. Emergency contacts

9.1 General

Notification of the internal contacts will be in accordance with the notification flow chart (Figure 7.1). External notification will be managed by the General Manager (or delegate) as required.

9.2 Population at risk

The dam failure assessment in Appendix B identified up to two properties or structures to be at risk from a failure of a declared dam (refer to Appendix B for location of local residents and flow depths). Contact details of the residences are presented in Table 9.1.

Table 9.1 - Local residents contacts list

Person	Property	Phone
██████████	'Almawillee' 82 Wadwells Lane	Home: ██████████ Mobile: ██████████
██████████	83 Wadwells Lane	Home: ██████████ Mobile: ██████████

9.3 WCC internal contacts

Table 9.2 identifies relevant WCC personnel who may be required to be notified.

Table 9.2 - WCC internal contact list

Company	Role	Phone
WCC	OCE	Mobile: ██████████
WCC	Operations Manager	Office: (02) 6763 6000 Mobile: ██████████
WCC	General Manager	Office: (02) 6741 9300 Mobile: ██████████
WCC	Environmental Officer	Office: (02) 6763 6000 Mobile: ██████████
WCC	Environmental Superintendent	Office: (02) 6763 6000 Mobile: ██████████
SLR Consulting	Dam Engineer	Office: (07) 4722 8020 Mobile: ██████████

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9.4 External contacts

Table 9.3 identifies relevant external parties who may be required to be notified.

Table 9.3 - External contacts list

External party	Phone
SES State Operations Centre	All hours: 1300 737 326 (1300 SES DAM)
SES – State Emergency Operations Centre (alternate contact to use <u>only if</u> State Operations Centre cannot be contacted)	1300 677 677
Dam Safety NSW – Dam Emergencies	Mobile: 0403 681 645 Office: (02) 9842 8073
NSW Environment Protection Authority	131 555
Liverpool Plains Shire Council	(02) 6746 1755
Emergency – Police, Ambulance, Fire Brigade	000
Non-emergency – Werris Creek Police Station	(02) 5778 5470
Public Health Unit – Tamworth	(02) 6764 8000
NSW Fire and Rescue	Business: (02) 6746 1415
NSW Department of Primary Industries – Tamworth Regional Office	(02) 6763 1100
NSW Transport – Roads and Maritime Services (road conditions reporting)	131 700
Essential Energy – Supply Interruption and/or reporting damage	13 20 80
Telstra – reporting damage	13 22 03

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10. Preventative actions

The declared dams are to be operated in accordance with the WCM O&M Plan and the characteristics detailed in section 3.1, thus reducing the likelihood of an emergency situation occurring. Water levels within the declared dams will be maintained below the Maximum Operating Level, provided in Table 3.1. The storage between the 'high water level' and the 'spillway level' is intended as buffer storage for prolonged wet weather conditions. The water level within the dams will be continuously monitored using level sensors combined with regular visual inspections, as detailed in section 4.2. Regular visual inspections and surveillance will be undertaken to monitor for signs of seepage or embankment deformation, in accordance with the O&M Plan. These activities are intended to provide early warning of any conditions which could potentially lead to the development of an emergency situation.

The results of the dam break assessment for the declared dams (summarised in Appendix B) indicate that it will take approximately 10 to 20 minutes for the water to reach the first residence downstream of the VWD that may be impacted. The emergency responses actions outlined in Section 6 include issuing warnings to downstream landholders if an overtopping release or structural failure is considered imminent, to allow sufficient warning and preparation should evacuation be required. The public roads south of the dams, including Paynes Road and Wadwells Lane may be overtopped from an uncontrolled release from the declared dams. The roads should therefore be barricaded should an uncontrolled release be imminent. The roads should be barricaded at least 300 m to the east and west of the intersection of Paynes Road and Wadwells Lane. Generally, water from a dam break is expected to flow for less than 24 hours.

There are a number of solutions that can be applied for immediate repairs in the event of an imminent emergency. These are detailed in Table 10.1.

Table 10.1 - Immediate emergency repairs examples

Potential issue	Solution	Task	Time to mobilise	Resources to mobilise
Spillway blockage at inlet or outlet	Unblock spillway	Excavate to remove blockage	2 hours	Excavator and 'moxy' trucks
Overtopping of dam embankment	Provide crest extension	Place sandbags to upstream side of crest. Dewater the dam immediately.	4 hours	Sandbags, waste rock, tip truck, loader or excavator

The Operations Manager is responsible for maintaining a register of available plant and resources including material, earthmoving equipment, transport and personnel which may be required to control or mitigate an incident.

This will generally include excavators, loaders, graders and truck; pumps and generators; sand, gravel, sandbags and geofabric.

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11. Record keeping

Key records associated with this Plan that are stored and managed include but are not limited to:

- level monitoring reports;
- any water sampling and laboratory analytical reports;
- calibration records for field instruments and telemetering systems;
- inspection checklists and maintenance records;
- incident report forms;
- surveillance and annual inspection reports;
- records of training, reviews and emergency exercises
- records of emergency situations (refer to Appendix C); and
- records of any review of this Plan.

Monitoring data is subject to quality assurance (QA) and quality control (QC) protocols and procedures that ensure that data is accurate and usable. Data is subjected to consistent validation and verification procedures. Any data that fails QA and QC procedures is rejected for future use.

In accordance with the monitoring and recording conditions of EPL 12290, all records relevant to the assessment and monitoring of dam safety are required to be kept for at least 4 years after the relevant event.

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12. Evaluation and review

In accordance with clause 22 of the Dams Safety Regulation, this DSEP will be tested through an emergency exercise undertaken by personnel who are involved in the operation of the declared dams at least once every 3 years. Testing of the DSEP is necessary to train participants, identify any weaknesses in the Plan and assist in identifying the equipment, resources and materials required to respond in an emergency. The testing of the DSEP may be undertaken as a theoretical classroom exercise (if a practical emergency exercise is proposed to be undertaken, relevant agencies identified in the DSEP should be involved if practicable). A record of the testing will be kept in a format similar to Table D1 in Appendix D and any resulting actions and recommendations will be reported in an emergency exercise evaluation report.

The DSEP emergency exercises are scheduled and planned as part of the overall emergency exercises and drills as outlined in the WCC Operations Emergency Response Plan and the PIRMP.

The Dams Safety Regulation requires a DSEP to be updated at least once every 5 years, and (within 30 days) in the following circumstances:

- if the declared dam consequence category changes;
- if there has been a significant change to the number of persons at risk; or
- if emergency arrangements change.

The Dams Safety Regulation requires a DSEP to be reviewed at least annually to ensure that a change to the contact details of a person responsible for exercising functions in the event of an emergency is updated as soon as practicable after the change.

The update of the DSEP will be summarised in the detailed document revision sheet at the front of this Plan.

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13. References

Australian and New Zealand Environment and Conservation Council (2000). *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*.

NSW Department of Planning, Industry and Environment (2021). *Dams Safety NSW Guideline for Emergency Plans*.

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14. Glossary

Term	Definition
Council	Liverpool Plains Shire Council
Declared dam	Has the same meaning as in the Dams Safety Act
Department	The NSW Department of Planning, Industry and Environment (DPIE)
Incident	An occurrence or set of circumstances that causes or threatens to cause material harm and which may or may not be or cause a non-compliance
Pollution incident	Has the same meaning as in the POEO Act
Project Approval	Development consent (DA 10_0059) issued on 25 October 2011 under Section 75J of the <i>Environmental Planning and Assessment Act 1979</i> by the Department of Planning & Infrastructure (as modified).
Total freeboard	The distance between the water line at the dam operational limit and the embankment crest
Void water	Water that accumulates in the open cut pit and is to be stored in the void water dams

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15. Document revision sheet

Revisions	Reviewed by	Revision Description	Who Consulted	Date
0	Harry Mills, Megan Martin, Huw Morgan		Murray O'Keefe	14 April 2022

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Appendix A Potential dam failure emergency scenarios

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Potential mechanisms that may result in a release from the declared WCM void water dams are summarised in Table A1.

Table A1 - Potential dam failure emergency scenarios

Mechanism	Trigger/Indicator	Potential Result	Remediation
Static embankment movement	Tension cracks in embankment crest, settlement of embankment, mounding at toe of embankment	Large settlement or batter slide may result in loss of containment and overtopping. Movement could indicate stability issues	Transfer dam water to separate compartment, stop inflow pumping and remediate dam stability issues. Investigate potential seepage through the liner and embankment soils.
Dynamic embankment movement	An earthquake induces shaking of the pond	Shaking of the embankment may result in settlement of the embankment crest and deformation of the batters	Drain dam compartment and remediate embankment
Seepage and/or wet soils observed at the toe of downstream embankment	If no seepage is observed in the seepage collection system this may indicate that the seepage collection system is not functioning and that seepage through the embankment is occurring	Ongoing seepage may lead to risk of piping erosion of embankment and severe surface erosion of slopes	Drain dam and investigate the integrity of the liner system
Embankment overtopping	A large rain event exceeds the discharge capacity of the spillway or the spillway is blocked	May result in water flowing over the embankment and eroding a breach, resulting in a loss of containment	If possible, unblock spillway and drawdown dam
Large defects in liner	Large volume of seepage water continuously pumped from sumps. Floating geomembrane liner	Ongoing seepage may result in erosion through the embankment	Drain dam and repair liner defects
Piping and tunnelling erosion	Sediment laden seepage from embankment surface with visible flow and possibly sediment fans on the downstream slope or toe area of the embankment	Ongoing seepage may result in progressive erosion of soil particles within the embankment, resulting in a release of water from the breach area adjacent to the embankment	Drain dam, inspect liner for defects and remediate embankment
Damage to or misuse of infrastructure	Suspected act of vandalism, sabotage or terrorism	May result in water release and loss of containment	Notify NSW Police

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Appendix B Dam failure assessment summary and inundation maps

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Dam failure assessment

VWD 1, VWD 3 and VWD 4 are currently classified as having a **significant consequence category** in accordance with the Dams Safety Act.

Sunny Day Failure:

A dam break at the VWD 1, VWD 3 or VWD 4 may result in the uncontrolled flow of void water into the surrounding area. Overfilling of a VWD in combination with other adverse conditions is considered to be the most likely dam failure trigger.

The Operations and Maintenance Plan for the VWD facilities will be followed to ensure that the likelihood of failure of the dam is minimised.

Should a dam break occur ("Sunny Day Failure") the direction of flow would likely be to the southwest toward two minor tributaries between Wadwells Lane and Paynes Road, approximately 1 km away. It is anticipated that inundation may:

- cover an area of up to 1.5 km²;
- be bound by Wadwells Lane to the west and Paynes Road to the south;
- have depths of up to 0.3 m;
- feature localised concentration of flow near other dams and minor tributaries;
- possibly impact property access along Wadwells Lane;
- possibly impact residences located:
 - north of Paynes Road, approximately 1 km west of Werris Creek Road;
 - east of Wadwells Lane, approximately 100 m north of intersection with Paynes Road; and
 - west of Wadwells Lane, approximately 100 m north of intersection with Paynes Road.

It is considered extremely unlikely that there would be any risk to life within these potential dam break areas.

Dam break from flood

VWD 1, VWD 3 and VWD 4 all have the capacity to store and/or pass the Probable Maximum Precipitation (**PMP**) event without overtopping when operated in accordance with the design. Each VWD facility has no external catchment and design calculations indicate that a five-day (120 hour) storm event with Annual Exceedance Probability (**AEP**) of 10⁻⁴ (i.e. 1 in 10,000 year event) has an estimated rainfall depth of 363 mm. Total freeboard (operational limit to crest) for each facility is as follows:

- VWD 1: 1.07 m;
- VWD 3: 1.3 m;
- VWD 4: 1.3 m.

In the event of a dam failure initiated by an extreme rainfall event, it is considered likely that at least part of the area downstream of the dams would already be affected by inundation. The contribution of uncontrolled released void water would not significantly influence the area, depth or velocity of flows. As such, there is not considered to be any risk to life for this scenario.



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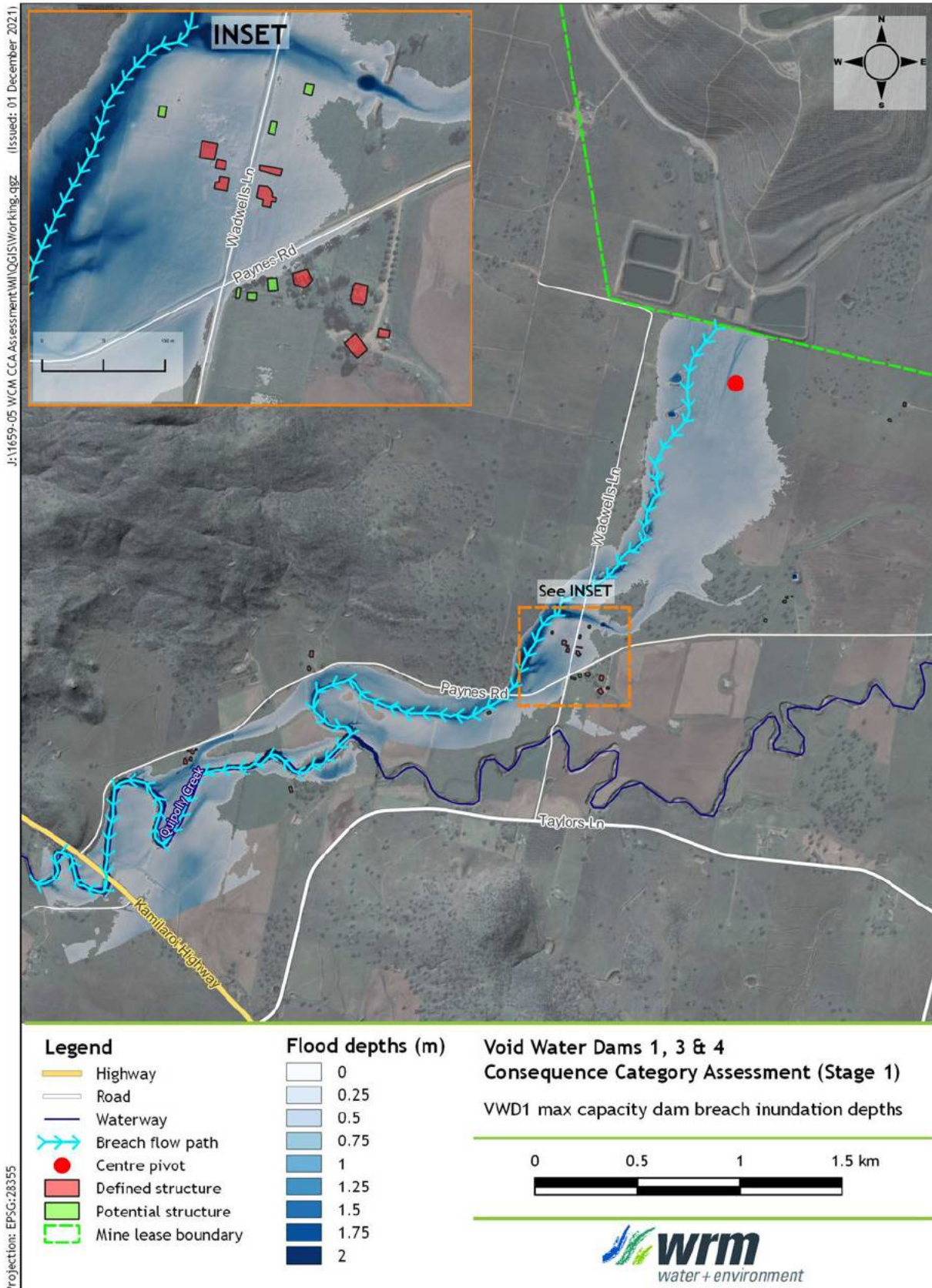


Figure B1 – VWD 1 maximum capacity dam breach inundation depths



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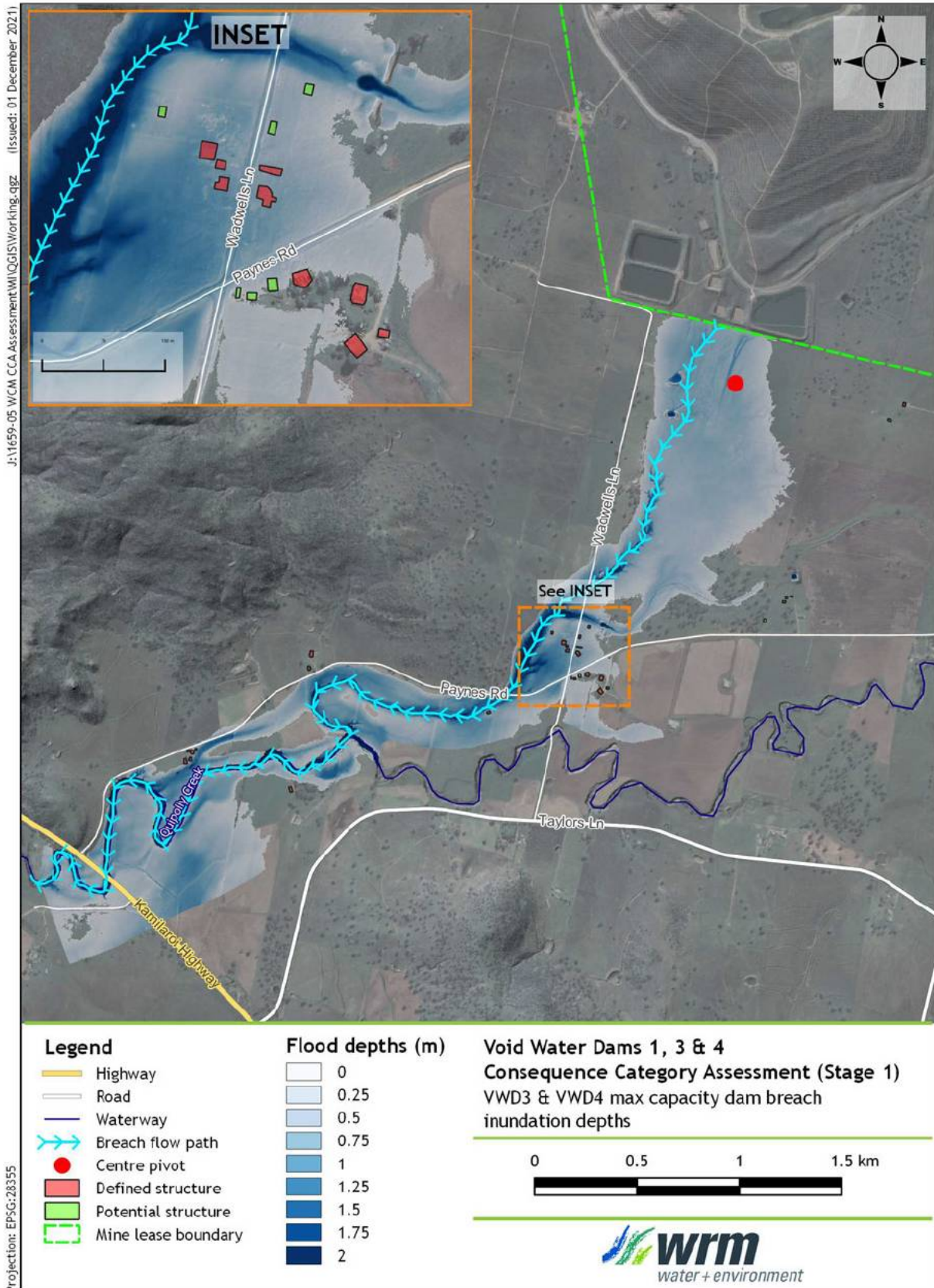


Figure B2 – VWD 3 & VWD 4 maximum capacity dam breach inundation depths

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Appendix C Records of emergency situations

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Emergency situations that occur during the operation of the declared void water dams at WCM should be recorded in Table D1, with reference made to any documents that summarise the events.

Table C1 - Record of emergency situations at the WCM declared void water dams

Date	Brief description of the emergency situation	References

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Appendix D DSEP training and review


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Table D1 - Record of DSEP testing

Date tested	Personnel involved	Actions / recommendations